

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C.

**FCC 97-403**

FCC MAIL SERVICE

DEC 5 1997

DISPATCH

In the Matter of

1997 Annual Access Tariff Filings

)  
)  
)  
)  
)  
)

CC Docket No. 97-149

**MEMORANDUM OPINION AND ORDER**

**Adopted:** December 1, 1997

**Released:** December 1, 1997

By the Commission:

**TABLE OF CONTENTS**

I.	Introduction	1
II.	Price Cap Carriers	
A.	Common Line Issues	5
1.	Background	7
2.	1997 Designation Order	13
3.	Discussion	19
B.	Equal Access Exogenous Cost Changes	
1.	Background	103
2.	Discussion	109
3.	SNET's Calculation of the Initial Equal Access Exogenous Cost Revenue Requirement	121
4.	Ameritech's Equal Access Amortization Revenue Requirement	123
C.	Other Billing and Collection	
1.	Introduction	125
2.	Background	129
3.	Apportionment of Customer Services Expenses Among Separations Categories by GTE	135
4.	Apportionment of OB&C Expense Among Service Classes	152
5.	Separation of Message, Toll Billing Expense	169
6.	Apportionment of OB&C Expense Among Access Elements	196
7.	Calculation of Exogenous Change in Interstate Expenses	197

III.	Cash Working Capital for Certain Rate-of-Return Carriers	
A.	Background	208
B.	Concord	211
C.	Chillicothe	212
D.	Roseville	217
E.	PRTC	222
IV.	Ordering Clauses	227

Appendix A - List of Parties Filing Pleadings

Appendix B - Base Factor Portion Revenue Requirement Calculations

Appendix C - Comment Summary

Appendix D - Calculation of Exogenous Adjustment for Equal Access Cost Recovery

## I. INTRODUCTION

1. On June 16, 1997, incumbent local exchange carriers (LECs) filed their 1997 annual access tariffs, scheduled to take effect on July 1, 1997.<sup>1</sup> On June 27, 1997, the Common Carrier Bureau (Bureau) released an Order finding that many of those tariff filings raised substantial questions of lawfulness, and accordingly suspended those tariffs for one day, initiated an investigation, and imposed on the LECs an accounting order.<sup>2</sup> Subsequently, the Bureau designated four sets of issues for investigation.<sup>3</sup>

2. Two of the areas designated for investigation relate to key changes to the Commission's access rules adopted by the Commission in the *Access Charge Reform Order*<sup>4</sup> and a third covers tariff revision implementation changes to our separations rules adopted in the Other Billing and Collection Order.<sup>5</sup> The Access Charge Reform Order significantly shifts the recovery of common line revenue between per-minute and flat charges, and between IXC's and end-users. This caused the Bureau to closely scrutinize the methods LECs used to develop their new common line rates. The *Access Charge Reform Order* also directed price cap LECs to adjust their price caps to reflect the completion of the amortization of equal access network reconfiguration costs. Recent changes to our separations rules required price cap LECs to make exogenous changes to their price caps to reflect changes in their treatment of their Other Billing and Collection (OB&C) costs. The Bureau also was concerned by the proposed cash working capital requirements of several LECs subject to rate-of-return regulation. The Bureau designated for investigation the LECs' proposed annual access tariff revisions relating to these areas.

3. Fifteen price cap LECs and four rate-of-return LECs filed direct cases

---

<sup>1</sup> For background on the Commission's access charge rules, see *Access Charge Reform*, CC Docket No. 96-262, *Price Cap Performance Review for Local Exchange Carriers*, CC Docket No. 94-1, *Transport Rate Structure and Pricing*, CC Docket No. 91-213, *Usage of the Public Switched Network by Information Service and Internet Access Providers*, CC Docket No. 96-263, *Notice of Proposed Rulemaking, Third Report and Order and Notice of Inquiry*, FCC 96-488 at ¶¶ 21-31 (rel. December 24, 1996).

<sup>2</sup> 1997 Annual Access Tariff Filings, National Exchange Carrier Association Universal Service Fund and Lifeline Assistance Rates, CC Docket No. 97-149, *Memorandum Opinion and Order*, DA 97-1350 (Com. Car. Bur., released June 27, 1997) (*1997 Suspension Order*).

<sup>3</sup> 1997 Annual Access Tariff Filings, CC Docket No. 97-149, *Memorandum Opinion and Order*, DA 97-1609 (Com. Car. Bur., released July 28, 1997) (*1997 Designation Order*).

<sup>4</sup> *Access Charge Reform*, CC Docket No. 96-262, *First Report and Order*, FCC 97-158 (rel. May 15, 1997).

<sup>5</sup> *Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board, Report and Order*, 12 FCC Rcd 2679 (1997) (*OB&C Order*).

responding to one or more sets of designated issues. Two parties filed oppositions, to which the LECs filed rebuttals. These parties, and the abbreviations by which we refer to them in this Order, are listed in Appendix A.

4. We have reviewed the direct cases, comments, and replies filed in response to the *1997 Designation Order*. Based on our examination of the LECs' tariffs, and the direct cases, comments, and replies, we find that certain of the price cap LECs' 1997 annual access rates are unreasonable. Specifically, we determine that U S WEST, Southwestern Bell, Bell Atlantic, NYNEX, Sprint, and GTE have unreasonably underestimated their BFP revenue requirements. Furthermore, we conclude that the BOCs, SNET, Frontier, GTE, and Rochester have unreasonably calculated the exogenous cost decrease necessary to reflect the completion of the amortization of equal access network reconfiguration costs, as required by the *Access Reform First Report and Order*.<sup>6</sup> In addition, we determine that GTE, Pacific Bell, and US West have unreasonably calculated the exogenous cost adjustments required by the revision of our other billing and collection (OB&C) cost allocation rules adopted in the *OB&C Order*. We also find that four rate-of-return LECs' rate bases include cash working capital amounts that were not calculated in compliance with the Commission's Rules.<sup>7</sup> The result of these LECs' unreasonable practices is tariff charges that are higher than is justified, in violation of section 201(b) of the Communications Act of 1934, as amended (the Act). Below, we discuss all these issues in detail, prescribe just and reasonable solutions to correct the ratemaking practices found to be unlawful, and we require LECs to revise and refile their tariffs and issue refunds. Refiled tariffs that do not comply with our prescriptions are unlawful and subject to rejection.

## II. PRICE CAP CARRIERS

### A. Common Line Issues

5. In its May, 1997, *Access Charge Reform Order*,<sup>8</sup> the Commission modified the common line rate elements in two important ways. First, the *Access Charge Reform Order* increased the end user common line (EUCL) cap applicable to multiline business (MLB) lines from \$6.00 to \$9.00 monthly.<sup>9</sup> Second, effective January 1, 1998, the *Access*

---

<sup>6</sup> See *Access Charge Reform*, CC Docket No. 96-262, First Report and Order, FCC 97-158 (released May 16, 1997) (*Access Reform First Report and Order*) at paras. 301-14.

<sup>7</sup> Section 65.820(d) of the Commission's Rules, 47 C.F.R. § 65.820(d).

<sup>8</sup> *Access Charge Reform*, CC Docket No. 96-262, First Report and Order, FCC 97-158 (rel. May 15, 1997).

<sup>9</sup> See *1997 Designation Order* at ¶ 5.

*Charge Reform Order* requires recovery of common line costs from IXCs first through flat-rated primary interexchange carrier charges (PICCs), up to a designated cap, before permitting the LECs to charge interexchange carriers a per-minute carrier common line charge.<sup>10</sup>

Because these two changes to the Commission's rules significantly shifted incumbent LEC recovery of common line revenues from IXCs to certain end users and from per-minute to flat-rated charges, and because the LEC tariff filings had not adequately demonstrated their compliance with all relevant Commission rules, the Common Carrier Bureau suspended the common line provisions of the price cap LECs' 1997 annual access tariff revisions for one day, imposed an accounting order, and set these provisions for investigation.

6. Below we describe how LECs that underestimate their per-line base factor portion (BFP) revenue requirement can thereby earn more common line revenues than our price cap rules would otherwise permit if the BFP revenue requirement had been properly forecast. Accordingly, we first look to determine whether the price cap LECs have consistently underestimated their per line BFP revenue requirement. To do this, analyze the difference between the forecasts and the reported actual per-line BFP revenue requirements for each LEC between the tariff years 1991/92 and 1996/97 using graphs to determine if the deficiencies appear to represent a downward bias in the proposed forecasts. Finally, we use a sign test to determine how likely it is that chance could explain the frequency with which LECs have employed forecasts that were less than the actual revenue requirements reported later, and a statistical test to determine if the mean of the six years of forecasts is significantly below the mean of the actual revenue requirements.<sup>11</sup> Based on this analysis, we conclude that six LECs have employed forecasts that reflect a consistent downward bias. For five of these LECs we further determine that their forecasts for the tariff year 1997/98 are likely to have the same bias and therefore we prescribe forecasts for per-line revenue requirement. For the sixth LEC, Bell Atlantic, we order the LEC to revise its BFP revenue requirement forecast using its existing forecasting method corrected for a flaw identified by AT&T. We require all these carriers to use their revised forecasts to recalculate their common lines rates for the period January 1, 1998 through June 30, 1998, and to calculate refunds for the period July 1, 1997 through December 31, 1997.

## **1. Background**

7. Common line is one of the baskets of services in our price cap rules and contains all the interstate access charges associated with the use of the local loop between the

---

<sup>10</sup> 47 C.F.R. § 61.46(d)(2).

<sup>11</sup> The sign test is the equivalent of calculating the probability that a someone using a fair coin would obtain six heads in six flips of the coin, or five heads in six flips, etc. The higher the number of heads (in excess of three) obtained in six flips, the less confidence one has that the coin is not tail-heavy.

end-user and the local switch.<sup>12</sup> The traffic sensitive and trunking baskets contain charges for use of the switch serving the loop and for transporting calls between that switch and the interexchange carrier's (IXC) local point of presence.<sup>13</sup> The remaining basket contains the non-access, interexchange services LECs are permitted to provide. Each year the price indices (PCIs) for the basket are adjusted upward for inflation and downward by a factor to reflect increases in LEC productivity. The Commission may also permit PCI adjustments for changes in the cost of providing service that are beyond the LEC's control and not otherwise reflected in the PCIs (i.e. exogenous cost changes). For price cap LECs, the revenue-weighted average price of the services in each basket may not exceed the basket PCI. The common line basket differs from the other baskets in having a separate formula to determine the maximum rate for the per-minute charge within the common line basket and in using LEC forecasts of their per-line local loop revenue requirements to determine the maximum end-user per-line charge.

8. The common line revenues permitted by our price cap rules for LECs are recovered through a per-line charge to end-users (the end user common line charge, or EUCL<sup>14</sup>) and a per-minute charge to IXCs (the carrier common line charge, or CCL charge). A portion of permitted common line revenues are specifically designated to be recovered through per-minute charges.<sup>15</sup> The undesignated remaining portion of permitted common line revenues is known as the base factor portion (BFP).<sup>16</sup> For establishing rates for the next tariff

---

<sup>12</sup> 47 C.F.R. § 61.42(d)(1).

<sup>13</sup> This general description of the structure of access charges does have exceptions, especially after implementation on January 1, 1998, of the rate structure changes in the *Access Charge Reform Order*. For example, under our *Access Charge Reform Order* the port on the switch that is dedicated to serving the end-user's loop will become a common line charge levied on end-users.

<sup>14</sup> The EUCL charge is also referred to as the subscriber line charge (SLC).

<sup>15</sup> Costs assigned directly to the CCL element and, therefore, recovered solely from IXCs, are those attributable to customer premises equipment (CPE), surrogate CPE, and customer premises wiring included in information origination-termination equipment accounts. 47 C.F.R. §§ 69.2(r), 69.501(b)-(c). The Commission recently revised section 69.501 to include the costs of public telephone loops in the BFP revenue requirement. See Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996, CC Docket No. 96-128, Report and Order, 11 FCC Rcd 2054 (1996); Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996, Order on Reconsideration, 11 FCC Rcd 21233 (1996) (*Payphone Reconsideration Order*); *aff'd in part and rev'd in part sub nom. Illinois Pub. Telecommunications Ass'n v. FCC*, No. 96-1394, *et. al.* (D.C. Cir. rel. July 1, 1997).

<sup>16</sup> The BFP revenue requirement is defined in Part 69 as that portion of an incumbent LEC's common line revenue requirement that remains after the assignment of the specific common line investment and expenses identified in the previous footnote exclusively to the CCL element. 47 C.F.R. §§ 69.501(e). Section 69.502 also provides that special access surcharge revenues shall be deducted from the BFP. 47 C.F.R. § 69.502.

period, the projected BFP revenue requirement directly affects the ceiling on the per-line EUCL charge.<sup>17</sup> Under our price cap rules, a LEC may set per-line end user charges at the lesser of: (1) its forecast per-line BFP revenue requirement, or (2) the applicable cap on per-line end user charges (\$3.50 for residential and single line business,<sup>18</sup> \$9.00 for multiline business<sup>19</sup>).<sup>20</sup> For example, if a LEC reported a per-line BFP revenue requirement projection of \$5.18, residential and single-line business EUCLs would be set equal to \$3.50 -- the EUCL cap for these classes of customers -- but would equal \$5.18 for multi-line business customers. Because the caps limit per-line charges, some portion of permitted common line revenues has been recovered in the per-minute CCL charges in each of the past price cap tariff periods (1991-1997) and in the current tariff period (1997/98).

9. A price cap LEC's maximum CCL charge is set not as a function of a projected revenue requirement under Part 69, but pursuant to a special price cap formula. Under this formula, in effect, the maximum CCL charge is derived from the last calendar year's (base-period) total common line revenue, reduced by a special common line PCI, minus the total revenue from the proposed EUCL charges times the base-period's number of lines. This difference is then converted into a per-minute charge by dividing by base-period minutes, increased by one-half of the growth in base-period minutes of use per-line. Thus, holding everything else constant, a decrease in proposed EUCL charges will result in higher CCL charges.

10. The special common line PCI, along with the adjustment for growth in minutes-of-use per-line, implement the Commission's decision to adopt a "balanced 50-50" formula for common line revenue recovery when it initiated price cap regulation. The formula allows price cap LECs to enjoy half the increase in revenues resulting from growth in

---

<sup>17</sup> After January 1, 1998, incumbent LECs will also use their projected BFP revenue requirement in developing the residual presubscribed interexchange carrier charge (PICC). See *Access Charge Reform*, CC Docket No. 96-262, First Report and Order, FCC 97-158 at ¶¶ 94-104 (rel. May 16, 1997) (*Access Charge Reform Order*).

<sup>18</sup> 47 C.F.R. § 69.152(d)(1). Effective January 1, 1998, the EUCL charge cap on non-primary residential lines will increase to \$5.00. 47 C.F.R. § 69.152(d)(2).

<sup>19</sup> 47 C.F.R. § 69.152(b)(3). Effective January 1, 1998, price cap LECs will recover the costs of ports on the line-side of the local switch through the common line rate elements, instead of through per-minute local switching charges. Also effective January 1, 1998, price cap LECs may recover marketing expenses through EUCL charges assessed on MLB and non-primary residential lines, subject to the EUCL cap. 47 C.F.R. § 69.156.

<sup>20</sup> If none of the caps is binding and the CCL charge is zero, there is no longer a common line revenue requirement and a price cap LEC's EUCL may be set at no more than its per-line permitted price cap common line revenues under price cap regulation.

minutes of use per-line.<sup>21</sup>

11. One of the implications of this special formula, is that LECs often should not be indifferent about the allocation of common line revenue recovery between per-minute and per-line charges. Under this formula, where projected per-line BFP revenue requirement falls between \$3.50 and \$9.00, a dollar decrease in revenue recovered per-line increases revenues recovered per-minute by more than a dollar except in the special circumstance when next year's growth in minutes per line exactly equals the factor used to reduce the per-minute charge. In practice, next year's growth in minutes per line is almost always greater than the factor used to reduce next year's per-minute charges ( $g/2$  or last year's growth in minutes per line divided by two), so increasing the allocation of permitted revenue recovery to per-minute charges will increase total LEC common line revenues. Reducing the allocation to per-line charges does not completely offset the revenue gain since minutes of use can be depended upon to increase faster than lines. LECs with BFP revenue requirements less than the \$9 MLB EUCL cap can recover common line revenues from per-line to per-minute charges, as opposed to per-line charges by introducing downward bias in their forecasts of per-line BFP revenue requirements. An inappropriately low forecast of per-line BFP revenue reduces the LEC's per-line MLB EUCL charge and raises the per-minute CCL charge that it can justify. This shift allows the LEC to earn higher common line revenues than our price cap rules would otherwise permit.<sup>22</sup>

12. Accurate per-line BFP revenue requirement projections are, therefore, vital to proper ratemaking. They are necessary to enable the LEC to set proper interstate EUCL charges, CCL charges, and, after January 1, 1998, the residual presubscribed interexchange carrier charge (PICC). In the *1997 Suspension Order*, the Bureau suspended the portions of the price cap LECs' tariffs relating to the BFP revenue requirement and end-user demand forecasts for one day and set these tariff provisions for investigation, because the price cap LECs failed to offer an adequate explanation of the bases for their BFP revenue requirement projections and in light of the wide variation between these projections and alternate

---

<sup>21</sup> Policy and Rules Concerning Rates for Dominant Carriers, Second Report and Order, 5 FCC Rcd 6786, 6793-95 (1990). See 47 C.F.R. § 61.46(d)(1).

<sup>22</sup> For example, assume a 6% growth in minutes per-line, the number of lines is constant and, thus, a  $g/2$  factor of 3%. Total common line permitted revenue is \$200 and an unbiased forecast of BFP revenue requirement is \$100. Ignoring the X-factor and inflation, the LEC would receive common line revenues of \$203: \$100 in per-line charges and \$103 in per-minute charges (\$100 base period revenue is reduced by 3%, then grows by 6%.) Using an inappropriately low forecast of \$50 for BFP revenue requirement, the LEC would receive \$204: \$50 in per-line charges and \$154 in per-minute charges. (All calculations are rounded.) An inappropriately low forecast will increase total common line revenue as long as minute growth exceeds line growth.

projections offered by AT&T.<sup>23</sup>

## **2. The 1997 Designation Order**

13. The *1997 Designation Order* required the price cap LECs to submit extensive information regarding their BFP revenue requirement and end-user demand projections and per-line EUCL charge calculations since 1991. These information requirements are summarized below. The *1997 Designation Order* also afforded carriers the opportunity to submit any other information justifying their BFP revenue requirements that they deemed appropriate.<sup>24</sup>

### **a. BFP Revenue Requirements**

14. In their 1997 annual access tariff revisions, the price cap carriers, in general, provided only cursory information as to the preparation of their BFP revenue requirement forecasts. Some indicated that they had used a "bottom-up" approach, whereby individual component budget figures affecting the BFP revenue requirement were projected for the upcoming year, or used a cost model.<sup>25</sup> Other carriers indicated that they had used a trend methodology, whereby recent growth trends were extrapolated to the future. These carriers then adjusted their revenue requirement forecasts to account for changes in various Commission rules, income tax adjustments, and other exogenous cost factors.

15. The *1997 Designation Order* required each price cap LEC to submit: (1) actual BFP revenue requirements, computed using ARMIS data, if available, for each calendar year between 1991 and 1996, and associated tariff years between 1991/92 and 1996/97, as well as BFP revenue requirements filed in each year's TRP for the same period;<sup>26</sup> (2) a list of any changes in its BFP revenue requirements over this period caused by changes to the Commission's rules, including an itemized quantification of these changes; and (3) documentation that explains the methodology used to compute its BFP revenue requirement for 1997/98, including information on any changes to the LEC's forecasting methodology.<sup>27</sup>

16. In addition, the *1997 Designation Order* required the price cap LECs to explain

---

<sup>23</sup> *1997 Suspension Order* at ¶ 22.

<sup>24</sup> *E.g.*, *1997 Designation Order* at ¶¶ 15, 18.

<sup>25</sup> *1997 Designation Order* at ¶ 29.

<sup>26</sup> ARMIS, columns k and m.

<sup>27</sup> *1997 Designation Order* at ¶ 16.

any significant differences (10% or more) between the projected year-to-year percentage change in the BFP revenue requirement filed in support of their proposed tariffs and the actual results reported later.<sup>28</sup> The *1997 Designation Order* required the price cap LECs to explain fully any pattern of significant and consistent over- or under-estimation of their BFP revenue requirements that emerged from this analysis.<sup>29</sup>

**b. End-User Demand**

17. Most price cap LECs indicated that they evaluated various factors, such as general economic performance and demographic characteristics, to project end-user demand levels. The *1997 Designation Order* required each price cap LEC that experienced a significant difference between its projected and actual end-user demand in a given year to: (1) identify separately for each such year the variables used to project end-user demand and the weight given to each; (2) provide information concerning at least the two most significant variables that did not change as expected; and (3) state whether the unexpected changes were the product of one-time events, or whether they represented changes in the underlying trend of end-user demand.<sup>30</sup> In addition, it required the price cap LECs either to demonstrate that their 1997/98 end-user demand projections were consistent with the historical trend, or to state specifically the underlying factor(s) that they expected will change, and the projected effects of the change(s).<sup>31</sup> The price cap LECs were also required to submit trend analyses using both actual numbers of lines, and natural logarithms of the actual numbers of lines.<sup>32</sup>

**c. Per-Line BFP Revenue Requirements**

18. The *1997 Designation Order* also required the price cap LECs to submit their actual and projected per-line BFP revenue requirements for each tariff year between 1991/92 and 1996/97, calculated by dividing the actual and projected BFP revenue requirements by total billable lines. With respect to the per-line BFP revenue requirement, the Bureau required the LECs to provide information "to explain any differences between the[] actual per-line BFP revenue requirements and the[] per-line BFP revenue requirements projected . . . for

---

<sup>28</sup> *Id.* at ¶ 17.

<sup>29</sup> *Id.*

<sup>30</sup> *1997 Designation Order* at ¶ 32.

<sup>31</sup> *Id.* at ¶ 33.

<sup>32</sup> *Id.* Logarithms are used to transform an exponentially increasing series into one that increases in a linear manner. The logarithm is the exponent to which a certain base number must be raised to yield a given member of the original series. Natural logarithms use e as a base, an irrational number with an approximate numerical value of 2.718 . . . .

each year."<sup>33</sup>

### 3. Discussion

#### a. Introduction and Summary

19. The *1997 Designation Order*'s stated intent was to use the LECs' actual and projected BFP revenue requirements to "establish the historical pattern of the LECs' BFP revenue requirements and the accuracy of their past projections."<sup>34</sup> In this Order, we first perform tests to identify the LECs that have consistently reported forecasts that were significantly below their actual per-line BFP revenue requirements. Our tests use LEC data that had been adjusted for differences between the forecast and actual per-line BFP that could be attributed to unforeseeable factors. Our tests include a graphical analysis of the differences between the forecasted and actual per-line BFP revenue requirement, a sign test to determine whether chance could explain why such a large portion of the BFP revenue requirement forecasts was less than the actual figures, and a test of the statistical significance of the difference in the mean forecasted and actual per-line BFP revenue requirements of each price cap LEC. For those LECs with mean forecasts significantly below their mean actual per-line BFP revenue requirements, we developed forecasts for the tariff year 1997/98 using actual per-line BFP revenue requirement data. The forecasts are adjusted for FCC actions regarding the treatment of payphones and OB&C that will affect 1997/98 actuals. As discussed more fully below, we conclude that these projections are likely to be reasonable forecasts of these LECs' per-line BFP revenue requirements for tariff year 1997/98.

20. We find that by developing reasonably unbiased and accurate forecasts, no matter what their forecasting technique, many LECs have met this standard. With respect to U S WEST, Southwestern Bell, NYNEX, Sprint, and GTE, however, the results of the sign test and the difference in the means test, combined with the absence of any adequate justification submitted by these LECs, support our conclusion, with a high degree of confidence, that these LECs' tariff year 1997/98 forecasts are not just or reasonable. In addition, using data submitted in its rebuttal to AT&T's opposition, Bell Atlantic fails the difference of the means test.<sup>35</sup> After examining the reasons offered by these LECs for their forecasting errors, and their descriptions of methodologies used to develop their tariff year 1997/98 forecasts, we conclude that there is a consistent and significant downward bias in the

---

<sup>33</sup> *1997 Designation Order* at ¶ 34.

<sup>34</sup> *1997 Designation Order* at ¶ 17.

<sup>35</sup> As discussed below, Bell Atlantic (South) has fully explained the source of the downward bias in its forecasting technique and is directed to use its corrected forecasting technique as the basis for refunds and refiled rates for common line.

forecasts of the per-line BFP revenue requirement developed by U S WEST, Southwestern Bell, NYNEX, Sprint, and GTE.

21. These unreasonable forecast results directly affect the lawfulness of the LECs' tariff changes. In this case, the resulting per-minute CCL charges are unjustifiably high, in violation of section 201(b).<sup>36</sup> We therefore conclude that the BFP revenue requirement forecasts filed in the 1997 annual access tariff revisions of U S WEST, Southwestern Bell, NYNEX, Sprint, and GTE, and the charges they produce, are unjust, unreasonable, and, therefore, unlawful.<sup>37</sup> The per-line BFP revenue requirement forecasts filed by U S WEST, Southwestern Bell, and NYNEX in their 1997 annual access tariff revisions are unjust and unreasonable because they are based on forecasting methodologies that have consistently produced downwardly biased results in the past, and because none of these LECs has taken any steps to correct for factors that have contributed to repeated and substantial past errors.<sup>38</sup> Although it has changed forecasting methodologies this year, GTE has developed a forecast for tariff year 1997/98 that differs significantly from the historical growth pattern such that we conclude it is not a reasonable forecast of its tariff year 1997/98 per-line BFP revenue requirement. Similarly, Sprint's historical substantial forecasting errors lead us to conclude that its tariff year 1997/98 forecast is likely also to be downwardly biased.

**b. Importance of Per-Line BFP Revenue Requirement Projections**

22. A LEC's projected BFP revenue requirement has an impact on the relative levels of interstate EUCL and CCL charges and, after January 1, 1998, on the residual PICC. For the tariff year 1997/98 the recent increase in the cap on the MLB EUCL charge increased the impact that per-line BFP revenue requirement projections have on EUCL and maximum CCL charges.<sup>39</sup> When a price cap carrier's per-line BFP revenue requirement

---

<sup>36</sup> 47 U.S.C. § 201(b).

<sup>37</sup> 47 U.S.C. § 201(b) ("All charges, practices, classifications, and regulations for and in connection with [interstate or foreign] communication service, shall be just and reasonable, and any such charge, practice, classification, or regulation that is unjust or unreasonable is hereby declared to be unlawful").

<sup>38</sup> SBC states that Southwestern Bell has used the same methodology to develop its BFP revenue requirement forecasts each year since 1991. SBC Direct Case at 23. By SBC's own calculations, its tariff year 1997/98 BFP revenue requirement forecast is approximately \$83 million below the historical trend, "very likely due to the same reasons as those related to the historical data." SBC Direct Case at 24. Similarly, U S WEST states in its Direct Case that it used the same methods to develop its tariff 1997/98 forecast that it used to develop its past, flawed forecasts, U S WEST Direct Case at 18, and candidly admits that the resulting forecast is "inconsistent with the historical pattern," *id.* at 15. Bell Atlantic states that NYNEX, despite consistent understatement of its BFP revenue requirement forecasts, has used the same forecasting methodology since tariff year 1992/93. Bell Atlantic Direct Case, Detailed Responses at 19.

<sup>39</sup> 1997 Suspension Order at ¶ 5.

projection is less than the \$9.00 MLB EUCL cap, that projection directly affects the relative proportions of its common line revenue recovered from end users, via EUCL charges, and from interexchange carriers, via CCL charges and PICCs.<sup>40</sup> As explained above, a LEC that inappropriately lowers its forecast of per-line BFP revenue requirement, will be able to establish a lower MLB EUCL charge and a higher CCL charge than it would otherwise be able to justify. Assuming the growth in minutes per line does not drop below one-half the base period growth in minutes per line ( $g/2$ ),<sup>41</sup> the LEC's aggregate common line revenues will be greater than our price cap rules would otherwise permit. Thus, we disagree with those price cap LECs that argue that, because the allocation of revenues between EUCL charges and CCL charges is a "zero-sum game," they have little or no incentive to underestimate their BFP revenue requirements.

**c. Adjustment of Per-Line BFP Revenue Requirement Forecasts**

23. In this section we consider the sources of forecasting error LECs have identified. We accept arguments that three rule changes could not have been foreseen at the time LEC forecasts were made, and we adjust LEC data before making our comparisons of forecast and actual per-line BFP revenue requirements. We reject LEC arguments that we should adjust for acts of nature, changes in business plans and the impact of demand-related factors. We agree to adjust GTE's data for sold exchanges and to remove GTE's Universal Service Fund support from its actual BFP revenue requirements. We also agree to adjust NYNEX's data to allow for a tax surcharge that is reported in its actual BFP revenue requirement, but not included in its forecast of BFP revenue requirement for ratemaking purposes.

24. Some LECs allege that certain Commission rule changes reduce the apparent accuracy of their forecasts. The graphical and statistical analyses used in this proceeding are not intended to evaluate the accuracy of the absolute level of the price cap LECs' forecasts. Rather, our analyses are intended to identify LECs whose forecast errors are due to significant and systematic downward bias in the per-line BFP revenue requirement. A LEC that makes even large over- and under-estimation errors may nevertheless pass our tests for downward bias. We agree, however, that LEC forecasts should be adjusted for rule changes that were announced after the LECs had prepared their forecasts, but that took effect during the tariff year being forecast. As discussed below and detailed in the statistical appendix to this order,

---

<sup>40</sup> As discussed above, if the per-line BFP revenue requirement exceeded the cap on MLB EUCL charges, EUCL charges would be set at that cap. In such a case, changes to the per-line BFP revenue requirement would not affect EUCL charge levels, or anticipated total common line revenues, until the per-line BFP revenue requirement fell below the MLB EUCL cap.

<sup>41</sup> Growth in minutes per line ( $g$ ) is equal to the percentage change in total minutes divided by the percentage change in lines. Therefore, a positive  $g$  means that minutes grew faster than lines.

we made allowances for several such rule changes.

25. The LECs have identified three such changes. The *Payphone Order*<sup>42</sup> and *Payphone Reconsideration Order*,<sup>43</sup> which also deregulated LEC payphone equipment, required LECs to assess MLB EUCL charges on LEC payphone loops and modified the Commission's BFP revenue requirement rule to include the costs of payphone loops in the BFP revenue requirement.<sup>44</sup> The Commission released the *Payphone Order* on September 20, 1996, and released the *Payphone Reconsideration Order* on November 8, 1996. These rule changes took effect April 15, 1997.<sup>45</sup> Because these rule changes affected the BFP revenue requirement for the last two and one-half months of tariff year 1996/97, but were not in effect when the price cap LECs developed their BFP revenue requirement forecasts in early 1996, we will adjust the LECs' tariff year 1996/97 BFP revenue requirement forecasts to account for these changes.<sup>46</sup>

26. Similarly, early this year, the Commission revised the process the LECs use to separate Other Billing and Collection (OB&C) costs between the state and interstate jurisdictions, replacing a complicated allocation procedure relying on user and message counts with a simple allocation procedure based on a fixed allocator of 33 percent or 5 percent, depending on whether the price cap LEC performs any end-user billing for IXCs.<sup>47</sup> The Commission released the *OB&C Order* on February 3, 1997, and these rule changes took effect on May 1, 1997. For their June filings, the LECs computed exogenous adjustments to reflect this change to the Commission's rules. Because this rule change affected the BFP revenue requirement for the last two months of tariff year 1996/97, but was not in effect when the price cap LECs developed their BFP revenue requirement forecasts in early 1996, we will adjust the LECs' tariff year 1996/97 BFP revenue requirement forecasts to account for these changes.

---

<sup>42</sup> 11 FCC Rcd 20541, 20605-36.

<sup>43</sup> 11 FCC Rcd 21233, 21321.

<sup>44</sup> The recent decision of the United States Court of Appeals for the D.C. Circuit in *Illinois Pub. Telecommunications Ass'n v. FCC*, No. 96-1394, *et. al.*, did not address the application of the rules adopted in the *Payphone Order* or *Payphone Reconsideration Order* with respect to the issue involved here.

<sup>45</sup> *Payphone Order*, 11 FCC Rcd at 20634.

<sup>46</sup> The 1996 Act clearly required the Commission to take these actions, although the method to be used to remove payphone equipment from the rate base, and the timing of such removal, remained uncertain until the Commission's *Payphone Order* and *Payphone Reconsideration Order* were released. 47 U.S.C. § 276.

<sup>47</sup> Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board, Report and Order, 12 FCC Rcd 2679 (1997) (*OB&C Order*).

27. Some LECs cite the effects of Commission-approved revisions to their depreciation rates on their BFP revenue requirement as one source of discrepancies between the actual and forecasted BFP revenue requirements. The effects of the revised depreciation rates cited were relatively small.<sup>48</sup> Nevertheless, because depreciation re-prescriptions are often released late in the calendar year, but allow LECs to revise their depreciation expense retroactively to reflect the new rates from the beginning of the year, we make these adjustments to LEC BFP revenue requirements for purposes of the statistical analysis below.

28. The statistical appendix shows the dollar amount of all adjustments we have made for rule changes that the Commission announced after the LECs had prepared their BFP revenue requirement forecasts for a given tariff year, but that took effect before the beginning of the following tariff year, including these depreciation-rate adjustments.

29. With respect to the BFP revenue requirement, these are the only rule changes we have been able to identify that the Commission announced after the LECs' developed their BFP revenue requirement forecasts, but that took effect before the beginning of the following tariff year. No LEC has identified any other such changes in the record. The Commission had announced all of the other rule changes affecting the BFP revenue requirement before the LECs were required to develop their BFP revenue requirement forecast for the years in which the rule changes took effect.<sup>49</sup> As such, the LECs' forecasts should already have accounted for the anticipated impact of these changes.

30. In addition to rule changes, the LECs allege that, in developing their BFP revenue requirement forecasts, they failed to foresee additional expenses they incurred as a result of the impact of certain natural phenomena, such as snow storms or floods. Among the natural phenomena cited, SBC states that the costs associated with flooding in 1993 and 1997 caused unanticipated increases in the BFP revenue requirements of Southwestern Bell and Nevada Bell, respectively. SNET identifies storms (1994/95),<sup>50</sup> and GTE cites nonspecific "acts of nature."<sup>51</sup> We conclude that no adjustment to the LEC data is necessary to correct for these expenses. Although unfavorable natural phenomena may have some immediate impact on LEC costs, a portion of the cost of recovery is capitalized and incorporated in future year projections of BFP revenue requirements. To the extent natural

---

<sup>48</sup> For example, for tariff year 1994/95, U S WEST calculates that revised depreciation rates explain \$3 million of its \$70 million error in forecasting its BFP revenue requirement. U S WEST Direct Case at 8.

<sup>49</sup> The Commission announced all rule changes incorporated in the LECs adjusted series 1 and series 2 BFP revenue requirement data before the LECs developed their forecasts for the years in which those rule changes took effect. For a list of these rule changes, see *1997 Designation Order* at ¶ 22.

<sup>50</sup> SNET Direct Case at Workpaper BFP-3.

<sup>51</sup> GTE Direct Case at 5.

phenomena have an unforeseen affect on actual BFP revenue requirements, we note that both favorable and unfavorable phenomena would have to be taken into account and that natural phenomena are famous as examples of randomness. We conclude that natural phenomena are not the type of unforeseeable events that would require us to make an adjustment before we attempt to detect any systematic downward bias in LEC forecasts.

31. In any event, the record before us indicates that expenses associated with recovery from damage caused by natural phenomena likely constitute a relatively small portion of the LEC errors, and do not explain any significant portion of the LECs' errors in underestimating their BFP revenue requirement. In their direct cases, the LECs have provided little information on the dollar impact of particular natural events, making it impossible in any case to adjust for these events. This lack of information supports our conclusion that these impacts are likely minor. SBC, for example, provides explanations unrelated to any natural phenomena for more than half of its \$76 million error in tariff year 1992/93, and cites the 1993 midwestern flood as the last of three additional reasons that may explain some of the remaining error. SBC provides no information as to the specific dollar impact of the flood, however.<sup>52</sup> This lack of information is representative of GTE's and SNET's submissions as well, supporting our conclusion that natural phenomena have only a minor effect on the annual BFP revenue requirement and are unlikely to explain repeated, substantial, or systematic underestimation.

32. Several LECs cite a wide variety of business decisions and expenses, such as those associated with early retirement incentives, overtime, workforce expansion, mergers, or restructuring, that they allege caused their BFP revenue requirement forecasts to fall below actual levels. Similarly, the LECs cite a variety of business restructurings<sup>53</sup> that have affected line counts. We conclude that these business decisions are not the type of unforeseeable event for which we should adjust any LEC's BFP revenue requirement forecasts when conducting statistical tests. Rather, these decisions are within the control of the LEC both at the time it develops its BFP revenue requirement forecast and throughout the balance of the tariff year. A LEC is not justified in repeatedly basing its BFP revenue requirement forecasts on unreasonably optimistic assessments of its likely costs of doing business in the upcoming year, but should make a realistic estimate of these costs at the outset, based in part on past experience. A LEC that forecasts its BFP revenue requirement based on such realistic assessments should experience high and low forecasting errors in an essentially random manner. Therefore, for a LEC that is using reasonable assessments of its business costs in the upcoming year, ordinary business decisions and expenses should not have any systematic

---

<sup>52</sup> SBC Direct Case at 6.

<sup>53</sup> *E.g.*, BellSouth Direct Case at Appendix D, Exhibit 3, p. 1. (citing unanticipated divestiture of Bell Coin marketing unit that affected the multiline business category in June, 1997); Ameritech Direct Case at Exhibit 7, p. 1. (citing restructure of business units to market to various segments of local market, stimulating line growth).

effect on the BFP revenue requirement. Furthermore, we have no reason to believe that all business decisions drive up revenue requirement. To adjust for only those business decisions that resulted in an unfavorable change in revenue requirement would introduce rather than remove a bias from our analysis. We have no reason to suggest that business decisions are not, like natural phenomena, random in their impact on revenue requirement. We conclude that no adjustment to the LEC BFP revenue requirement forecasts is required to account for the effects of the business decisions described by the LECs.

33. Some LECs indicate that their forecasting errors resulted from the failure of their forecasting techniques to anticipate the impact of a variety of demand-related factors in the upcoming tariff year. U S WEST's forecasting techniques, for example, apparently failed to anticipate significant increases in loop plant investment in tariff years 1994/95, 1995/96, and 1996/97.<sup>54</sup> Similarly, SBC states that Southwestern Bell has underestimated its BFP revenue requirement every tariff year between 1992/93 and 1996/97 by \$22 million to \$40 million because of the effects of subsequent cost studies that allocate certain costs to the local loop.<sup>55</sup> With respect to line counts, several LECs cite their failure to anticipate changes in economic conditions,<sup>56</sup> end-user demand trends,<sup>57</sup> or overly conservative forecasts<sup>58</sup> to explain differences between actual and forecasted line counts. We conclude that no adjustment is warranted for such failures. As with the effects of business decisions, discussed above, we conclude that unanticipated changes in demand are random phenomena that should not affect our analysis of systematic downward biases.

34. GTE explains in its Direct Case that it has sold a number of exchanges since 1991. To permit meaningful year-to-year comparisons, GTE provided data adjusted to include only the exchanges that it held throughout this entire period of time. We agree with GTE that these adjusted data will permit meaningful year-to-year comparisons, and accept GTE's submission of adjusted data. We make one additional adjustment for GTE. The 1997 *Designation Order* required the price cap LECs, where possible, to calculate their actual BFP revenue requirement using ARMIS data and a particular formula. This formula incorporated data from line 1185 of ARMIS 43-01. For its companies, GTE files ARMIS reports that include support amounts that GTE receives from the current Universal Service Fund in line 1185. Because its BFP revenue requirement forecasts do not include the Universal Service Fund support GTE receives, GTE provided a separate calculation deducting this support from

---

<sup>54</sup> U S WEST Direct Case at 8.

<sup>55</sup> SBC Direct Case at 5-7.

<sup>56</sup> E.g., U S WEST Direct Case at 19-20; SBC Direct Case at 31-32.

<sup>57</sup> E.g., SBC Direct Case at 17.

<sup>58</sup> U S WEST Direct Case at 19-20.

its actual BFP revenue requirements calculated as directed in Appendix B. We accept GTE's adjusted data.<sup>59</sup>

35. We also make one additional adjustment to the actual BFP revenue requirement data Bell Atlantic provides for NYNEX. In its direct case, Bell Atlantic indicates that, although the New York State Gross Income Tax (GIT) is included in NYNEX's actual BFP revenue requirement figures, NYNEX "does not include [the GIT] in EUCL rate development."<sup>60</sup> According to Bell Atlantic, "[t]he GIT is recovered as a surcharge on rates. This tax does not impact reported net income; the Company is merely acting as an agent on behalf of the state of New York (*i.e.*, the tax impacts expenses and revenues equally)."<sup>61</sup> Based on Bell Atlantic's representations, the GIT is included in NYNEX's actual BFP revenue requirement figures, calculated from ARMIS 43-01, but it is neither recovered from ratepayers through EUCLs nor included in NYNEX's BFP revenue requirement forecast. Accordingly, in performing our statistical analysis and developing our prescriptive forecast for NYNEX, below, we have adjusted NYNEX's actual BFP revenue requirement figures to account for the effects of the GIT.

#### **d. Analysis of Per-Line BFP Revenue Requirement Forecasts**

##### **(1) The Ten Percent Standard**

36. Several price cap carriers contend that the ten percent standard used by the Bureau in the 1997 *Designation Order* to identify a significant difference between each annual BFP revenue requirement forecast and the actual annual BFP revenue requirement is too strict.<sup>62</sup> The ten percent standard required LECs to provide explanatory information regarding a wide variety of factors that affected their forecasts. Therefore, this standard proved extremely useful as an information-gathering device, prompting explanatory statements regarding a large number of potentially significant forecasting errors. We agree that errors in the BFP revenue requirement or end-user demand forecasts individually do not necessarily lead to errors in the *per-line* BFP revenue requirement forecast. A LEC that does not meet the ten percent standard with respect to its BFP revenue requirement or end-user demand forecasts, therefore, may nevertheless show no statistically significant bias toward understatement of its *per-line* BFP revenue requirement.

---

<sup>59</sup> No other recipient of high-cost support from the universal service fund has indicated that it reports this support on ARMIS line 1185, and our independent examination of ARMIS data has not revealed evidence indicating such reporting, except by GTE.

<sup>60</sup> Bell Atlantic Direct Case, Detailed Responses at 7-8.

<sup>61</sup> *Id.*

<sup>62</sup> *E.g.*, Aliant Direct Case at 2; Bell Atlantic Direct Case at 4.

37. To determine whether the LECs have consistently underestimated their per-line BFP revenue requirement, we use a three-step analysis, consisting of increasingly more robust statistical testing techniques described below and in the Statistical Appendix. Initially, we graph the magnitude and direction of the differences between actual and forecasted per-line BFP revenue requirement for each year since 1991 to confirm that underestimation errors significantly outnumber overestimation errors. Secondly, we conduct a nonparametric sign test to determine whether chance alone could explain the frequency with which the forecasts were below actual per-line BFP revenue requirements. Finally, we determine for each LEC whether the mean of its 1991/92-1996/97 forecasts is so significantly below the mean of its 1991/92-1996/97 actuals as to warrant our prescription of a reasonable per-line BFP revenue requirement forecast for the 1997/98 tariff year.

## **(2) Graphical Analysis**

38. AT&T and MCI assert in this proceeding that the price cap LECs have consistently understated their BFP revenue requirement forecasts since 1991. Most of the price cap LECs submitted actual and forecasted per-line BFP revenue requirement data for each tariff year between 1991/92 and 1996/97, giving us a total of 75 observations.<sup>63</sup> These yearly data show that, the vast majority of the time, these price cap LECs, in the aggregate, underestimate their per-line BFP revenue requirement, with underestimates occurring in 58 of these 75 observations. We have reproduced below (in Figures 1 and 2) graphical analyses of the price cap carriers errors using actual and projected per-line BFP revenue requirement data, adjusted as discussed above.

---

<sup>63</sup> Seven BOCs and four of the independent price cap LECs each provided six years of data, for a total of 66 observations. Frontier provided only four years of data for Rochester Telephone because data from 1991 and 1992 no longer exist for that company. GTE provided only five years of data for its companies. Thus, the total is 75.

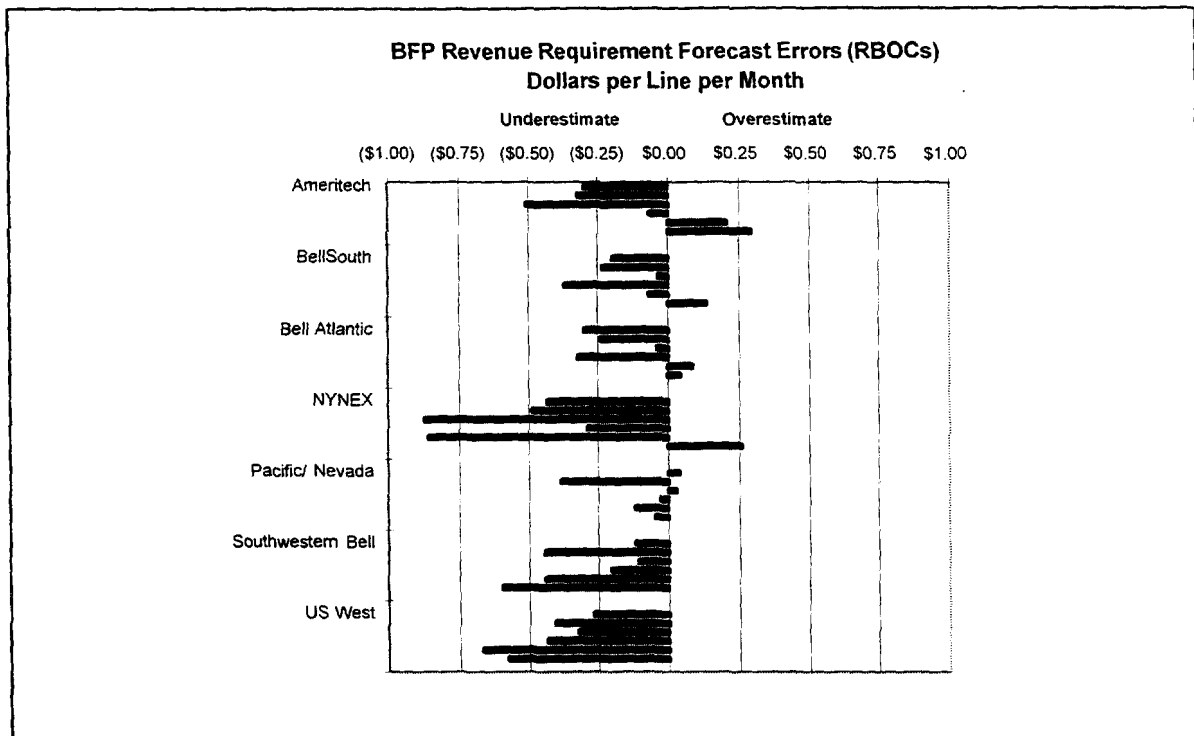


Figure 1

39. The BOCs, collectively, have underestimated their per-line BFP revenue requirement in 34 of the 42 observations reflected in the record before us, and the remaining price cap carriers have underestimated their per-line BFP revenue requirement in 23 of the remaining 33 observations. Because the data show that the price cap LECs, in general, and the BOCs, in particular, have underestimated their per-line BFP revenue requirement much more often than they have overestimated it, we conclude that we should proceed with further analysis to determine the magnitude of this potential problem.

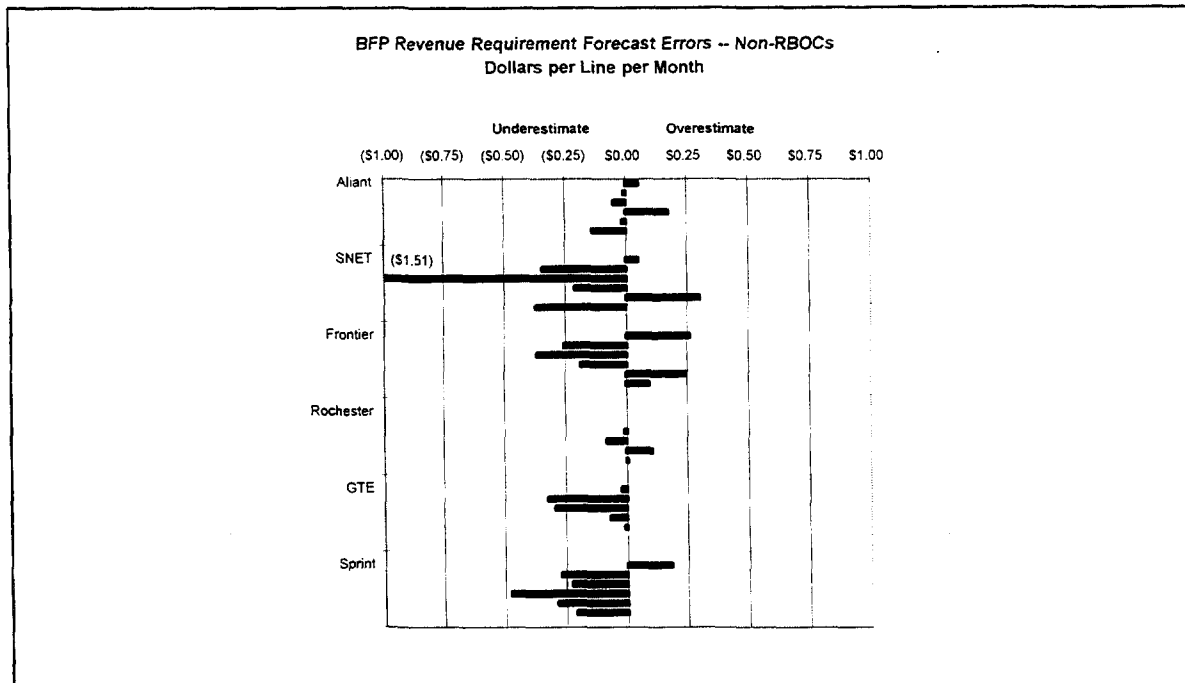


Figure 2

### (3) The Sign Test

40. We would expect that in any one year a LEC's forecast, based on unbiased forecasting techniques and accounting for all reasonably knowable factors, will differ from the actual per-line BFP revenue requirement due to the occurrence or absence of purely chance events, such as weather phenomena, other natural or man-made disasters, equipment failures, and other similar occurrences. In addition, some of the yearly error may be attributable to the limitations inherent in the LEC's forecasting techniques. By definition, however, an unbiased forecasting technique will show no propensity either to underestimate or to overestimate the per-line BFP revenue requirement. We conclude that these chance events are equally likely to create an error of a given magnitude in either direction, positive or negative, from the actual per-line BFP revenue requirement. In conducting the sign test, we assume that the probability that a LEC would underestimate its per-line BFP revenue requirement in any given year is .50 (fifty percent). Therefore, the probability that a LEC would overestimate its per-line BFP revenue requirement in any given year is also .50 (assuming that the probability that the LEC's forecast will be precisely correct is negligible). Using these reasonable assumptions and the sign test, we can calculate the probability that a LEC using unbiased forecasting

techniques,<sup>64</sup> would experience the actual pattern of under- and overestimates that we observe over these six years.<sup>65</sup>

41. As illustrated in the statistical appendix, U S WEST, Southwestern Bell, GTE, NYNEX, Sprint, and BellSouth all have underestimated their per-line BFP revenue requirement in at least five of the last six tariff years. Under the assumptions described above, the probability that a LEC using unbiased forecasting techniques would underestimate its per-line BFP revenue requirement for six consecutive years is less than two percent.<sup>66</sup> The probability that a LEC would underestimate its per-line BFP revenue requirement in five out of the six years we are reviewing in this investigation is less than ten percent.<sup>67</sup>

42. Aliant, SNET, Bell Atlantic, Ameritech, and PacTel underestimated their per-line BFP revenue requirement in four out of six years. The probability that a LEC, using unbiased forecasting techniques would underestimate its per-line BFP revenue requirement in four of the past six years is approximately 23 percent.<sup>68</sup> The remaining LEC's (Frontier) forecasting errors fall evenly over and under its actual per-line BFP revenue requirements.<sup>69</sup>

---

<sup>64</sup> In this section, we use the word "bias" in its statistical sense. A biased estimate results from the use of a forecasting method that itself creates distortions in the value of the estimate. An unbiased estimation process is considered desirable because, if repeated many times, an unbiased estimation process will generate estimates the mean of which will approach the mean of the actual population being estimated. We do not indicate with the term "bias" an intent on the part of any LEC deliberately to create understated per-line BFP revenue requirement forecasts beyond the LEC's intent to use the forecasting techniques in question.

<sup>65</sup> The sign test is discussed in greater detail in the Statistical Appendix. For an additional description, see JOHN E. FREUND ET. AL., *ELEMENTARY BUSINESS STATISTICS: THE MODERN APPROACH*, 564-68 (6th ed. 1993).

<sup>66</sup> There are two outcomes (overestimate or underestimate) possible each year over the course of six years. Therefore, there are 64 possible permutations of these outcomes ( $2^6$ ). Thus, the probability that the LEC would underestimate its BFP revenue requirement every year for six years, assuming that both outcomes are equally likely each year, is 1 out of 64, or approximately 1.56 percent.

<sup>67</sup> The probability is 6 out of 64, or approximately 9.38 percent. Thus, the probability that a LEC would underestimate its per-line BFP revenue requirement in at least five of the past six years is 7 out of 64, or approximately 10.94 percent.

<sup>68</sup> The probability of zero, one, two, or three out of six forecasts being above the actual level is 42/64, or approximately 65.63 percent. Similarly, the probability that a LEC would understate its per-line BFP revenue requirement forecast in four out of six cases is 15 out of 64, or approximately 23.43 percent.

<sup>69</sup> Although its data are unavailable for tariff years 1991/92 and 1992/93, the record indicates that Rochester Telephone has underestimated its per-line BFP revenue requirement twice and overestimated it twice since tariff year 1993/94. In addition, Bell Atlantic's Direct Case showed that it had underestimated its per-line BFP revenue requirement for three of the last six years. In response to AT&T's Opposition, Bell Atlantic corrected its actual (but not its forecasted) BFP revenue requirements as suggested by AT&T. These corrections changed the sign of one of Bell Atlantic's errors.

43. Because the results of the sign test indicate that virtually all of the price cap LECs have underestimated their per-line BFP revenue requirement far more often than they have overestimated it, we conclude that, as a group, the price cap LECs forecasts may exhibit a systematic downward bias. We recognize that the sign test may have some limitations. For example, by failing to take into account the magnitude of any errors, even relatively accurate forecasts could fare poorly against the sign test, if they fell consistently to one side of the actual level by even a minimal amount. So, although the sign test provides a reliable preliminary indicator that the forecasts of the price cap LECs, as a group, likely show a downward bias, we will supplement it with another common statistical testing method -- the difference in the means test.

#### **(4) The Difference in the Means Test**

44. We recognize that the development of per-line BFP revenue requirement forecasts is an inexact process. Whether the LEC uses a "bottom-up" approach by forecasting the performance of individual factors that affect the per-line BFP revenue requirement, or a trend-based approach, using past growth to indicate likely future performance, we could not reasonably expect the LECs' forecasts to correspond precisely to the actual per-line BFP revenue requirements eventually revealed by the historical data. As discussed above, however, we reasonably would expect a LEC making unbiased forecasts of its per-line BFP revenue requirement to err in such a manner that its forecasts may sometimes be less than the actual per-line BFP revenue requirement, and sometimes be greater than the per-line BFP revenue requirement. If the LECs' projections were unbiased estimators of the actual per-line BFP revenue requirement, the LEC's forecasts should tend to center around the actual per-line BFP revenue requirements, with the errors balancing each other out. In other words, over time, we conclude that the mean per-line BFP revenue requirement, forecasted using unbiased estimators, should approach the mean actual per-line BFP revenue requirement.

45. The statistical appendix shows each price cap LEC's forecasted, and adjusted, actual per-line BFP revenue requirement for tariff years 1991/92 through 1996/97, and the difference between the two figures.<sup>70</sup> Qualitatively, some of the LECs' estimates, particularly those that sometimes overestimate the per-line BFP revenue requirement and sometimes underestimate the per-line BFP revenue requirement, appear consistent with our conclusion that the mean forecasting error, over time, should approach zero. To measure whether the difference between the mean forecast and mean actual per-line BFP revenue requirement is statistically significant, or whether the difference may instead be attributed merely to chance, we will test these data using a difference in the means test. The test methodology is described more fully in the statistical appendix.

---

<sup>70</sup> In conducting the difference in the means test, we have used the same adjusted data we used for the sign test, above.

46. Because we have a relatively small data sample, we assume a  $t$  distribution. The  $t$  distribution is similar to the bell-shaped curve of a normal distribution, but is somewhat flatter, reflecting the lower degree of confidence associated with small samples. As discussed above, we conclude that a LEC, using unbiased forecasting techniques and accounting for all knowable factors affecting its per-line BFP revenue requirement in the coming year, is equally likely to create an error of a given magnitude in either direction, positive or negative, from the actual per-line BFP revenue requirement. The  $t$  distribution reflects this fact.

47. The difference in the means test we apply here is a one-tailed test using a 90 percent confidence interval (permitting us to reach conclusions concerning the difference in the means at the .10 level of significance).<sup>71</sup> Determining a reasonable confidence interval can be a difficult judgment. Given the limited number of data points we have here, however, we conclude that this confidence interval is reasonable. Although this is the Commission's first analysis of the price cap LECs' per-line BFP revenue requirements using techniques of statistical analysis, the Common Carrier Bureau has evaluated other LEC forecasts in the context of annual access tariff investigations using a 90 percent confidence interval.<sup>72</sup> Because this investigation represents our first statistical evaluation of the price cap LECs per-line BFP revenue requirement forecasts under price cap regulation, we are conservative in our evaluation of the reasonableness of these LECs' forecasts, consistent with the fact that the burden of proof rests with the price cap LECs in this investigation. Thus, in our judgment, a 90 percent confidence interval reasonably assures that, if a LEC fails this test, the failing result will not be due to chance. This confidence interval, therefore, provides a high degree of confidence that the LECs failing this test show a statistically significant downward bias in their per-line BFP revenue requirement forecasts, while not requiring such a high level of confidence that we would be unlikely to capture genuine downward bias. Therefore, a 90 percent confidence interval permits the LECs a reasonable margin for error, but protects ratepayers and IXCs from the danger that a higher confidence interval would fail to detect actual bias in the LECs' forecasting practices, which ultimately affect rate levels. In future years, if further investigation of the LECs' forecasts becomes necessary, we will have a greater amount of data, and may find it appropriate to revise the size of this confidence interval.

48. The difference in the means test indicates, at the .10 level of significance, that the forecasting errors of U S WEST, Southwestern Bell, NYNEX, Bell Atlantic (South), Sprint, and GTE have not arisen by chance, but are the result of some bias present in the

---

<sup>71</sup> We use a one-tailed test because we only want to test whether the mean of forecasts is significantly below the mean of actuals.

<sup>72</sup> See, e.g., Annual 1988 Access Tariff Filings, Memorandum Opinion and Order, 3 FCC Rcd 1281, 1305 (Com. Car. Bur. 1987).

forecasting techniques of these LECs.<sup>73</sup>

### **(5) Explanations and Forecasts Offered by Individual LECs**

49. Because the forecasts filed by U S WEST, Southwestern Bell, GTE, NYNEX, Bell Atlantic (South), and Sprint have failed both the sign test and the difference in the means test, we conclude that their forecasting techniques underestimate the per-line BFP revenue requirement in a statistically significant manner. As such, we conclude that these LECs' tariff year 1997/98 forecasts are likely to be the product of biased forecasting techniques. Nevertheless, we conclude that we should not automatically reject as unreasonable the provisions relating to the BFP revenue requirement forecast contained in the tariff filings of these LECs. Instead, we will again examine the reasons offered by those LECs for their forecasting errors to determine whether these LECs have offered any explanation that would tend to negate our conclusion that biased forecasting techniques have resulted in a statistically significant pattern of underestimating of the per-line BFP revenue requirement. We will use this information, coupled with our independent evaluations of the LECs' likely per-line BFP revenue requirement for tariff year 1997/98, to determine whether the tariff year 1997/98 forecasts appear reasonable.

#### **i. U S WEST**

50. U S WEST attributes its forecasting errors, in general, to faulty budget estimates. For example, for tariff years 1992/93 and 1993/94, U S WEST states its BFP revenue requirement forecast error was primarily the result of its understated budget projections. Similarly, for tariff years 1994/95 through 1996/97, U S WEST cites significant increases in its investment in loop plant installed to serve customers.<sup>74</sup>

51. We find U S WEST's explanations unpersuasive in judging whether a downward bias likely exists in its tariff year 1997/98 forecast. While budgeting errors and increased investment in loop plant may in fact have caused U S WEST's repeated underestimating of its BFP revenue requirement, U S WEST has provided no indication that its current forecast is likely to be less biased than its past forecasts. Although U S WEST

---

<sup>73</sup> In applying the difference in the means test to determine at .10 level of significance whether the difference in the means is statistically significant, we used the *t* distribution, which is appropriate for data samples of less than 30. With six observations (five degrees of freedom), the critical *t* is 1.476, indicating that, in repeated, random sampling, we would expect the mean forecast to be less than the mean actual per-line BFP revenue requirement by less than 1.476 standard deviations 90 percent of the time. If the calculated *t* for a particular LEC is less than the critical *t*, this difference is statistically significant at the .10 level., *i.e.*, not attributable to chance. The testing methodology and results are set forth in greater detail in the statistical appendix.

<sup>74</sup> U S WEST Direct Case at 7-8.